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Dividends From Wood Research

Recent Publications
January–June 1997

Explanation and Instructions

"Dividends From Wood Research" is a semiannual listing of recent publications resulting from wood utilization research at the Forest Products Laboratory (FPL). These publications are produced to encourage and facilitate application of Forest Service research. This issue lists publications received between January 1 and June 30, 1997.

Each publication listed in this brochure is available through at least one of the following sources.

Available from FPL (indicated by an order number before the title of the publication): Quantities limited. Circle the order number on the blank at the end of the brochure and mail or fax the blank to FPL.

Available through the Internet: Listed publications are available as PDF documents for viewing or printing from FPL's web site (<http://www.fpl.fs.fed.us/>).

Available through sales outlets: Major sales outlets are the Superintendent of Documents, the National Technical Information Service (NTIS), and various private publishers. Order directly from the outlet.

Available through libraries: Research publications are available through many public and university libraries in the United States and elsewhere. U.S. Government publications are also available through many Government Depository Libraries. Check with a major library near you to determine availability.

List of Categories

Publications are listed in this brochure within the following general categories:

- Biodiversity and Biosystematics of Fungi
- Decay Processes and Bioprocessing
- Durability
- General
- Papermaking and Recycling
- Properties and Use of Wood, Composites, and Fiber Products
- Surface Chemistry
- Timber and Fiber Demand and Technology Assessment
- Wood Chemistry

Biodiversity and Biosystematics of Fungi

Variations in Endophytic Fungi From Roots and Leaves of *Lepanthes* (Orchidaceae)

Bayman, Paul; Lebrón, Ligial; Tremblay, Raymond D.; Lodge, D. Jean
1997. New Phytol. 135: 143–149.

Microbial Diversity and Tropical Forest Functioning

Lodge, D. Jean; Hawksworth, David L.; Ritchie, Barbara J.
1996. In: Oriens, Gordon H.; Dirzo, Rodolfa; Cushman, J. Hall, eds. Biodiversity and ecosystem processes in tropical forests (Ecological studies; v. 122). Berlin Heidelberg New York: Springer-Verlag. Chap. 5: 69–100.

Two Undescribed Species Related to *Mycena Ixpantha* in Ecuador

Lodge, D. Jean
1996. Mycologist. 10(2): 56–57.

Fungal Responses to Disturbance: Agriculture and Forestry

Miller, R.M.; Lodge, D.J.
1997. In: Wicklow/Soderstrom, eds. The Mycota—Environmental and microbial relationships. Vol. IV. New York, NY: Springer-Verlag, Berlin Heidelberg: 65–84.

Microfungi From Decaying Leaves of Two Rain Forest Trees in Puerto Rico

Polishook, J.D.; Bills, G.F.; Lodge, D.J.
1996. J. Ind. Microb. 17: 284–294.

Rogersonia, a New Genus of the Hypocreales

Samuels, Gary J.; Lodge, D. Jean
1996. Sydowia. 48(2): 250–254.

Decay Processes and Bioprocessing

Enhanced Removal of CCA from Treated Wood by *Bacillus Licheniformis* in Continuous Culture

Clausen, Carol, A.
1997. In: Proceedings of the The International Research Group on Wood Preservation; 28th annual meeting; 1997 May 25–30; Whistler, British Columbia, Canada. The Research Group on Wood Preservation. Document IRG/WP 97–50083.

**Environmentally Benign Biological Wood Preservatives
by *Streptomyces Rimosus*, SC-36**

Croan, Suki.

1997. In: Proceedings of the The International Research Group on Wood Preservation; 28th annual meeting; 1997 May 25–30; Whistler, British Columbia, Canada. The Research Group on Wood Preservation. Document IRG/WP/ 97–10196.

**Pectin Degradation During Colonization of Wood by
Brown-Rot Fungi**

Green III, Frederick; Kuster, Thomas A.; Highley, Terry L.
1996. Recent Res. Devel. in Plant Pathology 1: 83–93.

**Are Bacteria Omnipresent on *Phanerochaete chrysosporium*
Burdalls?**

Janse, B.J.H.; Gaskell, J.; Cullen, D.; Zapanta, L.; Dougherty, M.J.; Tien, M.
1997. Appl. Environ. Microbiol. 63(7): 2913–2914.

Roles for Microbial Enzymes in Pulp and Paper Processing

Kirk, T. Kent; Jeffries, Thomas W.
1996. In: Jeffries, Thomas W.; Viikari, Liisa, eds. Enzymes for pulp and paper processing. ACS Symposium Series 655. Proceedings, 211th ACS national meeting; 1996 March 24–28; New Orleans, LA. Washington, DC: American Chemical Society: 2–14. Chap. 1.

**Interaction of Peroxidase Systems With Recombinant
Glyoxal Oxidase From *Phanerochaete chrysosporium***

Kurek, B.; Kersten, P.J.
1996. In: Srebotnik Ewald; Messner, Kurt, eds. Biotechnology in the pulp and paper industry—recent advances in applied and fundamental research: Proceedings, 6th international conference on biotechnology in the pulp and paper industry; Vienna, Austria: Facultas–Universitätsverlag: 397–400.

**Toner Removal by Alkaline-Active Cellulases from Desert
Basidiomycetes**

Sreenath, Hassan K.; Yang, Vina W.; Burdall, Harold H., Jr.; Jeffries, Thomas W.
1996. In: Jeffries, Thomas W.; Viikari, Liisa, eds. Enzymes for pulp and paper processing. ACS Symposium Series 655. Proceedings, 211th ACS national meeting of the Cellulose, Paper, and Textile Division; 1996 March 24–28; New Orleans, LA. Washington, DC: American Chemical Society: 267–279. Chap. 21.

**Methods in Plant Biochemistry and Molecular Biology.
Dashek, William V., ed. Boca Raton, FL: CRC Press: 1997.**

**Antibody-Mediated Immunochemistry and
Immunoassay in Plant-Related Diseases** by Clausen,
Carol A.; Green III, Frederick. Chap. 6: 73–88.

Carpogenesis and Basidiosporogenesis by Croan, Suki.
Chap. 2: 13–21.

Decolorization of Wood Sapstain by Croan, Suki. Chap.
3: 23–26.

**Assay and Purification of Enzymes—Oxalate
Decarboxylase** by Dashek, William V.; Micales, Jessie A.
Chap. 5: 49–71.

**Isolation, Separation, and Characterization of Organic
Acids** by Dashek, William V.; Micales, Jessie A. Chap. 9:
107–113.

Durability

**Field Performance of New Wood Preservative Systems in
Secondary Timber Species**

Laks, Peter E.; Gutting, Kurt W.; De Groot, Rodney C.
1997. In: Proceedings of the The International Research Group on Wood Preservation; 28th annual meeting; 1997 May 25–30; Whistler, British Columbia, Canada. The Research Group on Wood Preservation. Sec. 3. Wood protecting chemicals. IRG/WP 97–60077.

**The Development of Decay in Untreated, Second-Growth
Douglas-fir Using Two Exposure Techniques in North
Queensland, Australia**

Norton, Jack; De Groot, Rodney C.; Kleinschmidt, Scott;
Crawford, Douglas.
1997. In: Proceedings of the The International Research Group on Wood Preservation; 28th annual meeting; 1997 May 25–30; Whistler, British Columbia, Canada. The Research Group on Wood Preservation. Sec. 2. Test Methodology and Assessment. IRG/WP 97–60077

**Nondestructive Evaluation for Detection of Honeycomb
in the Sawmill: An Economic Analysis**

Anderson, R. Bruce; Wiedenbeck, Janice K.; Ross, Robert J.
1997. Forest Prod. J. 47(6): 53–59.

Evaluation of New Creosote Formulations

Crawford, Douglas M.; De Groot, Rodney C.
1996. In: Ritter, Michael A.; Duwardi, Shella Rimal; Lee, Paula D. Hilbrich, eds. Proceedings, National conference on wood transportation structures—new wood treatments; 1996 October 23–25; Madison, WI. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR 94: 371–378.

**Integrated Efficacy Evaluations of New Preservatives in
Alternative Wood Species**

De Groot, Rodney; Crawford, Douglas; Woodward, Bessie
1996. In: Ritter, Michael A.; Duwardi, Shella Rimal; Lee, Paula D. Hilbrich, eds. Proceedings, National conference on wood transportation structures—new wood treatments; 1996 October 23–25; Madison, WI. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR 94: 379–388.

**Relative Tolerance of CCA by Larvae and Adults of
the Common Shipworm, *Bankia gouldi***

Johnson, Bruce R.; Lebow, Stan T.
1996. Mater. und Organ. 30: 73–78.

**Duration of Constant and Ramp Loading on Strength
of Wood**

Liu, Jen Y.; Schaffer, Erwin L.
1997. J. Eng. Mech. 123(5): 489–494.

**The Relationship Between Stress Wave Transmission
Characteristics and the Compressive Strength of
Biologically Degraded Wood**

Ross, Robert J.; De Groot, Rodney C.; Nelson, William J.;
Lebow, Patricia K.
1997. Forest Prod. J. 47(5): 89–93.

Preservative Treatment Evaluation of Red Maple and Yellow-Poplar with ACQ-B

Slahor, Jeffery J.; Hassler, Curt C.; DeGroot, Rodney C.; Gardner, Douglas J.
1997. Forest Prod. J. 47(4): 50–54.

Preservative Treatment of Red Maple

Smith, William B.; Abdullah, Nazri; Herdman, Douglas; De Groot, Rodney C.
1996. Forest Prod. J. 46(3): 35–41.

1. FPL Roof Temperature and Moisture Model—Description and Verification

Anton TenWolde
1997. USDA Forest Serv. Res. Pap. FPL–RP–561. 48 p.

This paper describes a mathematical model to predict attic temperatures, relative humidities, and roof sheathing moisture content.

Treatability and Durability of Heartwood

Wang, John Z.; De Groot, Rodney
1996. In: Ritter, Michael A.; Duwardi, Shella Rimal; Lee, Paula D. Hilbrich, eds. Proceedings, National conference on wood transportation structures—wood preservatives; 1996 October 23–25; Madison, WI. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR 94: 252–260.

2. Feasibility of Fiberglass-Reinforced Bolted Wood Connections

Windorski, Daniel F.; Soltis, Lawrence A.; Ross, Robert J.
1997. USDA Forest Serv. Res. Pap. FPL–RP–562. 9 p.

This study examined the technical feasibility of reinforcing wood at bolted connections with fiberglass and epoxy resin. Test results are given for connections loaded both parallel and perpendicular to grain. In addition, shear block and tension perpendicular-to-grain strength results are given to gain insight on how material properties correlate with connection behavior. The scope was limited to one wood species, one type of fiberglass reinforcing system, one epoxy resin, one connection configuration, and three layers of reinforcement.

General

Dehydrogenation Polymer–Cell Wall Complexes as a Model for Lignified Grass Walls

Grabber, John H.; Ralph, John; Hatfield, Ronald D.; Quideau, Stéphane; Kuster, Thomas; Pell, Alice N.
J. Agric. and Food Chem. 44(6): 1453–1459.

An Altitudinal Comparison of Growth and Species Composition in Hurricane-Damaged Forests in Puerto Rico

Walker, Lawrence R.; Zimmerman, Jess, K.; Lodge, D. Jean; Guzman–Grajales, Sandra
1996. J. of Ecology. 84: 877–889.

Papermaking and Recycling

Papermachine Runnability of Never Dried, Dried, and Enzymatically Treated Dried Pulp

Abubakr, S.; Rutledge–Cropsey, K.; Klungness, J.H.
1996. In: Srebotnik Ewald; Messner, Kurt, eds. Biotechnology in the pulp and paper industry—recent advances in applied and fundamental research: Proceedings, 6th international conference on biotechnology in the pulp and paper industry; Vienna, Austria: Facultas-Universitätsverlag: 151–156.

Retention Mechanism of Metal Cations in Recycled and Never-Dried Pulps

Abubakr, Said M.; Hrutfiord, Bjorn F.; Reichert, Thomas W.; McKean, William T.
1997. Tappi J. 80(2): 143–148.

Recycling of Three Holographic Stamp Stocks

Abubakr, Said; Bormett, David W.; Klungness, John; Ross Sutherland, Nancy; Fatah, Alim; Kunar, Rajendra
1996. In: Proceedings of the 1996 TAPPI pulping conference; 1996 October 27–31; Nashville, TN. Atlanta, GA: TAPPI PRESS: 407–409. Book 1.

Repulping and Cleaning of Recovered Paper: Undeliverable and Discarded Mail

Abubakr, Said; Bormett, David W.; Sykes, Marguerite S.; Klungness, John; Ross Sutherland, Nancy; Fatah, Alim; Kunar, Rajendra
1996. In: Proceedings of the 1996 TAPPI pulping conference; 1996 October 27–31; Nashville, TN. Atlanta, GA: TAPPI PRESS: 410–417. Book 1.

Assignment of the Photoyellowing Related 1675 CM⁻¹ Raman/IR Band and Its Implication to the Mechanism of Color Reversion in Mechanical Pulps

Agarwal, Umesh P.
1997. In: Proceedings of the 9th international symposium on wood and pulping chemistry; 1997 June 9–12; Montreal, Quebec, Canada. Montreal, Quebec, Canada: Canadian Pulp and Paper Association: K4-1 –K4-4 (Oral Presentation).

Industrial Scale-Up of Fiber Loading on Deinked Wastepaper

Heise, Oliver; Klungness, John; Fineran, William, Jr.; Tan, Freya; Sykes, Marguerite; Abubakr, Said; Eisenwasser, Jacob
1996. In: Proceedings of the 1996 TAPPI pulping conference; 1996 October 27–31; Nashville, TN. Atlanta, GA: TAPPI PRESS: 895–900. Book 2.

Deinking Flexographic Newsprint: Using Ultrafiltration to Close the Water Loop

Upton, Bradley H.; Krishnagopalan, Gopal A.; Abubakr, Said
1997. Tappi J. 80(2): 155–164.

Characterization of Ultrafiltration for Flexographic Newsprint Deinking

Upton, Bradley H.; Krishnagopalan, Gopal A.; Abubakr, Said
1996. In: Hart, Peter W., ed., Brogdon, Brian N., Joseph, James C.; Roy, Biran P., co-eds. Fundamentals and applications in pulping, papermaking, and chemical preparation: the 1995 Forest Products symposium. New York, NY: American Institute of Chemical Engineers: AIChE Symposium Ser. 311: (92): 152–159.

Properties and Use of Wood, Composites, and Fiber Products

3. Review of Thickness Swell in Hardboard Siding—Effect of Processing Variables

Carll, Charles G.
1997. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–96. 10 p.

Medium-density hardboard is used extensively as siding on residential structures. One hardboard behavior that can be measured in the laboratory is thickness swell after exposure to water. This report reviews the literature on processing variables that are known or likely to influence thickness swell. Where the literature on hardboard is sparse, research on other wood composition materials is cited, with appropriate caveats relevant to hardboard. Initially prepared as technical guidance to the U.S. Department of Housing and Urban Development, this report should be of interest to anyone concerned about thickness swell of hardboard siding.

Visual Stress Grades of Dahurian Larch Lumber

Ethington, Robert L.; Gupta, Rakesh; Green, David W.
1997. Forest Prod. J. 47(1):82–88.

Wood Recycling—Opportunities for the Woodwaste Resource

Falk, Bob
1997. Forest Prod. J. 47(6): 17–22.

Critical Variables in the Rapid Cure and Bonding of Phenolic Resins

Geimer, Robert L.; Christansen, Alfred W.
1996. Forest Prod. J. 46(11/12): 67–72.

Influence of Juvenile Wood on Dimensional Stability and Tensile Properties of Flakeboard

Geimer, Robert L.; Herian, Victoria L.; Xu, Danping
1997. Wood Fiber Sci. 29(2): 103–120.

New Opportunities for Mechanical Grading of Lumber

Green, David W.
1997. Wood Design Focus. 8(2): 21–24.

4. Strength and Stiffness of Reinforced Yellow-Poplar Glued-Laminated Beams

Hernandez, Roland; Davalos, Julio F.; Sonti, Somnath S.; Kim, Youngchan; Moody, Russell C.
1997. USDA Forest Serv. Res. Pap. FPL–RP–554. 28 p.

This study is part of an overall effort aimed at evaluating the potential for commercial production of glulam-glass-fiber-reinforced plastic (GFRP) beams in current wood-laminating plants and a wood adhesive compatible with existing equipment. Twelve Yellow-Poplar glulam GFRP beams were commercially manufactured, and their performance was evaluated.

Timber Bridges in Southern Iowa

Hilbrich Lee, Paula D.; Ritter, Michael A.
1997. In: Kempner, Leon Jr.; Brown, Colin B., eds. Building to last. Proceedings, Structures Congress XV; 1997 April 13–16; Portland, Oregon. New York, NY: American Society of Civil Engineers: Vol. 1: 295–299.

Red Maple Lumber Resources for Glued-Laminated Timber Beams

Janowiak, John J.; Manbeck, Harvey B.; Hernandez, Roland; Moody, Russell C.
1997. Forest Prod. J. 47(4): 55–64.

Fiber Loading: Theory and Applications

Klungness, John H.; Sykes, Marguerite S.; Tan, Freya; Abubakr, Said
1997. In: Proceedings of the 4th international refining conference; 1997 March 18–20; Fiuggi, Italy. United Kingdom, England: Pira International: 1–10.

Mechanical Properties of Fire-Retardant-Treated Plywood After Cyclic Temperature Exposure

LeVan, Susan L.; Kim, Jong Man; Nagel, Robert J.; Evans, James W.
1996. Forest Prod. J. 46(5): 64–71.

Glued-Laminated Timber

Moody, Russell C.; Hernandez, Roland
1997. In: Smulski, Stephen, Ed., Engineered wood products—A guide for specifiers, designers and users. ISBN-0096556736-O-X. Madison, WI: PFS Research Foundation: 1-1–1-39. Chap. 1.

5. Multiple-Bolted Joints in Wood Members—A Literature Review

Moss, Peter James
1997. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–97. 18 p.

This study reviewed the literature on experimental and analytical research for the connection of wood members using multiple laterally loaded bolts. From this, the influence of geometric factors, optimum fastener configurations, row factors and length-to-diameter bolt ratios, spacing end and edge distances, and the effect of mixed types and sizes of fasteners and eccentric loading. Areas of additional research needed on multiple-bolted joints in wood members are identified.

Relationship Between Log and Lumber Modulus of Elasticity

Ross, Robert J.; McDonald, Kent A.; Green, David W.; Schad, Kristin
1997. Forest Prod. J. 47(2): 89–92.

Bending to Shear Ratio Approach for Beam Design

Soltis, Lawrence A.; Rammer, Douglas R.
1997. Forest Prod. J. 47(1): 104–108.

6. Field Performance of Timber Bridges—11. Spearfish Creek Stress-Laminated Box-Beam Bridge

Wacker, James P.; Ritter, Michael A.; Stanfill–McMillan, Kim; Brown, Nikki T.; Becker, Jonathon R.
1997. USDA Forest Serv., Res. Pap. FPL–RP–556. 17 p.

The Spearfish Creek bridge was constructed in 1992 in Spearfish, South Dakota. It is a single-span, stress-laminated, box-beam superstructure. Performance of the bridge is being monitored for 5 years, beginning at installation. This report summarizes results for the first 3-1/2 years of monitoring and includes information on the design, construction, and field evaluations of the wood moisture content, force level in the stressing bars, behavior under static loading, and overall structure condition.

Serviceability Modeling of Fire-Retardant-Treated Plywood Roof Sheathing

Winandy, Jerrold E.
1996. In: Proceedings of the third wood building/architecture technical seminar; 1996 Nov. 14; Seoul, Korea: Seoul, Korea: Korean Wooden Architecture Association: 46–63.

Effects of Fire Retardant Retention, Borate Buffers, and Redrying Temperature After Treatment on Thermal-Induced Degradation

Winandy, Jerrold E.
1997. Forest Prod. J. 47(6): 79–86.

ISO 9000: Issues for the Structural Composite Lumber Industry

Winistorfer, Steve G.; Steudel, Harold J.
1997. Forest Prod. J. 47(1):43–47.

Agricultural Fibers for Use in Building Components

Youngquist, John A.; Krzysik, Andrzej M.; English, Brent W.; Spelter, Henry N.; Chow, Poo
1996. In: Proc. The use of recycled wood and paper in building applications. Proc. 7286. Madison, WI: Forest Products Society: 123–134.

Surface Chemistry

Effect of Overdrying on Toughness of Yellow-Poplar Veneer

Christiansen, A.W.
1997. Holz als Roh-und Werkstoff. 55: 71–75.

Analytical Studies on Tara Tannins

Garro Galvez, J.M.; Riedl, B.; Conner, A.H.
1997. Holzforschung. 51(3): 235–243.

Kinetic Model for the Acid-Catalyzed Formation of Difurfuryldiamines From Furfurylamine and Aldehydes

Holfinger, Michael S.; Conner, Anthony H.; Hill, Charles G. Jr.
1997. Ind. Eng. Chem. Res. 36: 605–613.

Structurally Durable Epoxy Bonds to Aircraft Woods

Vick, Charles B.; Okkonen, E. Arnold
1997. Forest Prod. J. 47(3): 71–77.

Timber and Fiber Demand and Technology Assessment

7. Role of Wood Production in Ecosystem Management

Barbour, R. James; Skog, Kenneth E., eds
1997. Proceedings of the sustainable forestry working group at the IUFRO All Divisions 5 Conference; 1997 July; Pullman, Washington. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–100. 98 p.

The presentations at this symposium discussed concepts of ecosystem management and sustainability as viewed by various levels of government and private land managers. The theme was to integrate ecology, silviculture,

forest operations, wood products, and economics to find ways to develop healthy sustainable ecosystems under financially sound management practices. Speakers discussed ways to manage disturbance to create landscapes with the desired level of diversity and resilience to fire, disease, and insects. Others identified technical aspects of improving the options for producing wood and promoting healthy ecosystems. The feasibility of the various modes of forest operation were considered along with methods to evaluate the financial aspects of activities in different stand types. Lastly, the concept of sustainability was discussed, both in theory and through case studies. A full paper is presented for the majority of presentations; an abstract is included for others.

8. U.S. Timber Production, Trade, Consumption, and Price Statistics 1965–1994

Howard, James L.
1997. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–98. 75 p.

This report presents information on trends in production, trade, consumption, and prices of forest products in the United States. Although national trends are dealt with for the most part, some information is given for regions, states, and Canada. The tables presented are from information collected from industry trade associations and government agencies. Some tables show data that are derived from mathematical calculations and conversions from different units of measurement. These data are intended for use by anyone associated with wood-using industries. One major use of these data is to track technological change over time.

Income and Diversity Tradeoffs From Management of Mixed Lowland Dipterocarps in Malaysia

Ingram, C. Denise; Buongiorno, Joseph
1996. J. Tropical Forest Sci. 9(2): 242–270.

United States Wood Biomass for Energy and Chemicals: Possible Changes in Supply, End Uses, and Environmental Impacts

Skog, Kenneth E.; Rosen, Howard N.
1997. Forest Prod. J. 47(2): 63–69.

Wood Chemistry

Volatile Organic Chemical Emissions From Composite Wood Products: A Review

Baumann, Melissa G.D.
1997. Technical summary. In: The Fibril Angle; newsletter. Washington, DC: Cellulose, Paper, and Textile Division of the American Chemical Society: 1–12 (Spring).

A New Environmentally Benign Technology for Transforming Wood Pulp Into Paper—Engineering Polyoxometalates as Catalysts for Multiple Processes

Weinstock, Ira A.; Atalla, Rajai H.; Reiner, Richard S.; Moen, Mark A.; Hammel, Kenneth E.; Houtman, Carl J.; Hill, Craig L.; Harrup, Mason K.
1997. J. Molecular Catalysis A: Chemical: 116: 59–84.

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